Crystal ball questions on Enthalpy change calculations

All of the following questions have not (as yet!) appeared in the NCEA Level 2 Exams

QUESTION: Carry out the following enthalpy change calculations

1) The equation for the combustion of magnesium is:

$2Mg + O_2 \longrightarrow 2MgO \qquad \Delta H = -1200kJ$

Calculate the enthalpy change when:

i) 1 mole of magnesium reacts with oxygen.

ii) 0.35 moles of magnesium reacts with oxygen.

iii) 1.5g of magnesium reacts with oxygen.

2) The Thermite reaction is used to weld railway tracks.

$2Al(s) + Fe_2O_3(s) \longrightarrow Al_2O_3(s) + 2Fe(s)$

i) In a controlled demonstration of the reaction, 2.1 g of aluminium was reacted with excess iron(III) oxide and 70.3 kJ of energy was released. Calculate $\Delta_r H$ for the reaction.

ii) Calculate the mass of iron produced when 240kJ of heat energy is given off.

3) The energy released when sucrose, reacts with oxygen is 5650 kJ mol^{-1}. A person running five kilometres needs 1640kJ of energy. Calculate the mass of sucrose needed to provide the energy for a five kilometre run. M (sucrose) = 342 g mol^{-1}

4) Octane (C_8H_{18}), a component of petrol burns in excess oxygen to produce carbon dioxide and water. The heat of combustion of octane is -5530 kJ mol^{-1} If the density of petrol is 0.698 gcm-3, calculate the energy released when 40 litres of petrol burns completely in oxygen (assume that petrol is entirely composed of octane)

5) Calculate the enthalpy change for the combustion of 0.256 mol of BBQ gas (propane)

$C_3H_8(g) + 5O_2(g) \rightarrow 3CO_2(g) + 4H_2O(l) \qquad \Delta_r H = -2220.1$ kJ mol^{-1}

6) Ethanoic acid is made industrially by reacting methanol with carbon monoxide.

$CH_3OH(l) + CO(g) \longrightarrow CH_3COOH(l) \qquad \Delta_r H = -356$ kJ mol^{-1}

i) Calculate the quantity of heat evolved during the reaction if 1.5 dm^3 of ethanoic acid is produced. The density of ethanoic acid is 1.05g/cm^3

ii) Calculate the volume of ethanoic acid made when 3×10^4 kJ of energy are produced.